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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/898,008	07/05/2001	Paul Anuzis	110023	1652
25944	7590	08/24/2004	EXAMINER	
OLIFF & BERRIDGE, PLC			LE, TOAN M	
P.O. BOX 19928			ART UNIT	
ALEXANDRIA, VA 22320			PAPER NUMBER	
			2863	

DATE MAILED: 08/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/898,008	ANUZIS ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Toan M Le	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12 July 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All   b) ☐ Some \*   c) ☐ None of:  
     1. ☐ Certified copies of the priority documents have been received.  
     2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
     3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/12/04 has been entered.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-18 are rejected under 35 U.S.C. 102(b) as being anticipated by “Gas Turbine Engine Condition Monitoring Using Statistical and Neural Network Methods”, Patel et al. (Referred hereafter Patel et al.).

Referring to claim 1, Patel et al. disclose a method for monitoring the health of a system (Abstract), which comprises performing at each of a plurality of times the steps of: constructing a condition signature for a present time from a plurality of condition indicators including (a) a plurality of vibration measurements acquired from the system or (b) one or more vibration measurements and one or more performance parameter measurements acquired from the system (page 3, section 4: lines 7-17 and section 5: lines 1-4); predicting a normal signature from a model defining one or more inter-dependencies between condition indicators used to construct

Art Unit: 2863

the condition signature for a previous time, the normal signature corresponding to a condition signature for a healthy system at the present time (page 2, lines 9-13); comparing the condition signature for the present time with the normal signature (page 3, section 4: lines 15-24); and registering an event if the condition signature for the present time differs from the normal signature by more than a predetermined threshold (page 3, section 4: lines 25-31).

As to claims 2, 5, 10, and 13, Patel et al. disclose a method for monitoring the health of a system, wherein the model is a learnt model comprising a neural network (page 3, section 4: lines 15-24).

Referring to claims 6 and 14, Patel et al. disclose a method for monitoring the health of a system, wherein the steps of comparing the condition signature with the normal signature involves calculating a prediction error (page 3, equation 7).

As to claim 7, Patel et al. disclose a method for monitoring the health of a system, wherein the times define successive intervals of at most 1 sec duration (figure 5).

Referring to claim 8, Patel et al. disclose a method for monitoring the health of a system, which comprises performing at each of a plurality of times defining successive intervals of at most 1 sec duration (Abstract; figure 5) the steps of: constructing a condition signature for a present time from a plurality of condition indicators including (a) a plurality of vibration measurements acquired from the system or (b) one or more vibration measurements and one or more performance parameter measurements acquired from the system (page 3, section 4: lines 7-17 and section 5: lines 1-4); predicting, from condition indicators used to construct the condition signature for a previous time, a normal signature corresponding to a condition signature for a healthy system at the present time (page 2, lines 9-13); comparing the condition signatures for

Art Unit: 2863

the present time with the normal signature (page 3, section 4: lines 15-24); and registering an event if the condition signature for the present time differs from the normal signature by more than a predetermined threshold (page 3, section 4: lines 25-31).

As to claim 9, Patel et al. disclose a method for monitoring the health of a system, which comprises performing at each of a plurality of times defining successive intervals of at most 1 sec duration, wherein the normal signature is predicted from a model defining one or more inter-dependencies between the condition indicators used to construct the condition signature for the previous time (page 3, equations 4-6).

As to claim 16, Patel et al. disclose a method for monitoring the health of a system, wherein the system comprises a gas turbine engine (Abstract).

Referring to claims 17-18, Patel et al. disclose a data processing system incorporated into a method for monitoring the health of a system, comprising: data acquisition means for acquiring a plurality of condition indicators from the system at each of a plurality of times defining successive intervals of at most 1 sec duration, the condition indicators including (a) a plurality of vibration measurements or (b) one or more vibration measurements and one or more performance parameter measurements and a processor means for constructing a condition signature for a present time from the condition indicators and for predicting a normal signature corresponding to a condition signature for a healthy system at the present time, the normal signature being predicted by a model which defines one or more inter-dependencies between condition indicators used to construct the condition signature for a previous time (page 2, lines 9-13; page 3, section 4: lines 7-17 and section 5: lines 1-4); comparator means for comparing the condition signature for the present time with the normal signature (page 3, section 4: lines 15-

Art Unit: 2863

24); and registration means for registering an event if the comparator for the present time indicates that the condition signature differs from the normal signature by more than a predetermined threshold (page 3, section 4: lines 25-31).

Claims 3-4, 11-12, and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The primary reason for allowance of the claims 3-4, 11-12, and 15 is using matrix modeling with one or more non-zero off diagonal terms defining the interdependencies to calculate a value for the normalized innovations squared, wherein the measurements are synchronized and subject to novelty detection while Patel et al. teach using conditional distribution function in modeling to construct innovations squared (equations 6-7). Furthermore, Patel et al. do not mention data are synchronized from data acquisition means and storage means.

**Remarks:**

***Response to Arguments***

Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

“Gas Turbine Engine Health Monitoring and Prognostics”, Greitzer et al., International Society of Logistics (SOLE) 1999 Symposium, August 30-September 2, 1999

Art Unit: 2863

“Applying Neural Networks to Determine Vibration Parameters in a Turbine”, Caulkins et al., 1999 IEEE

“The Application of Expert Systems and Neural Networks to Gas Turbine Prognostics and Diagnostics”, DePold et al., Journal of Engineering for Gas Turbines and Power, ASME, October 1999, Vol. 121, Pages 608-612


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toan M Le whose telephone number is (571) 272-2276. The examiner can normally be reached on Monday through Friday from 9:00 A.M. to 5:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, John Barlow can be reached on (571) 272-2269. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.

Toan Le

August 11, 2004

  
John Barlow  
Supervisory Patent Examiner  
Technology Center 2800